

PRESS RELEASE

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A Masters in Biorefinery & Biomaterials

In conjunction with Grenoble INP-Phelma, Grenoble INP-Pagora now offers a *Biorefinery and Biomaterials* course as part of its Masters in Materials Science and Engineering. Launched at the beginning of the 2018 academic year, the course – which is taught in French and English at Masters 1 level and in English alone at Masters 2 level – is aimed at students who are keen to work in industries that use biomass to produce chemicals, energy and biomaterials.

The conversion of biomass into energy, chemicals and polymers is an important component of the green economy. It contributes to the drastic reduction of greenhouse gas emissions, the intensification of recycling and the minimisation of waste. Bioenergy, biofuels, bioproducts and biopolymers are all now a reality. However, the rate at which their production is growing must be stepped up considerably if their contribution is to meet the challenges we face. This will require new skills to become available.

Biorefinery is the process that enables plant resources to be converted into energy and chemicals. While similar in definition to a traditional refinery, the wide variety of materials and the complexity of their chemical composition make biorefinery a highly specific engineering process. The chemistry involved also differs from that of petrochemistry:

→ plant constituents are structured with three essential atoms (C, H, O) – oil has just two (C, H) – which generates greater complexity.

→ these structures are complex organic architectures that can be valorised as is. This can be an advantage for the production of products and materials that offer new properties.

The Biorefinery & Biomaterials course covers the entire process, from the procurement of lignocellulosic biomass, i.e., essentially wood, to the production of chemicals, biofuels, synthons and biopolymers that can replace fossil-based products. The programme places an emphasis on the constituents of lignocellulosic biomass (lignin, hemicellulose, cellulose, extractable products) and their

Grenoble INP-Pagora, the international school of paper, print media and biomaterials. The school is Quality, Safety & Environment certified and part of Grenoble INP, an engineering institute geared towards training “engineers who are creative, responsible and committed to a sustainable world”. It trains engineers for the sectors of green chemistry, paper, printing, packaging, biomaterials and printed electronics. It also offers a vocational degree: *Interactive Print and Digital Media*. Its wide range of courses, pedagogical expertise and strong partnerships with industry allow it to continuously tailor its training to the needs of businesses and to the 60 graduates it produces each year, thus enabling them to embark upon stimulating careers in France and abroad. Grenoble INP-Pagora also develops international training in conjunction with several European universities, as well as offering a 2nd year engineering course, a Master *Biorefinery & Biomaterials* and a Post-Master *Biorefinery: bioenergy, bioproducts & biomaterials* dispensed in English. The innovative research performed by its LGP2 laboratory helps to improve processes and create products that meet all the latest requirements, notably those linked to the environment. The Cerig's role is to keep an active eye on technological developments in these industries. These various activities ensure that the training offered is up to date with the latest scientific and technological advances.

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The Laboratory of Pulp and Paper Science and Graphic Arts (LGP2) is a joint research unit (UMR 5518) run by the CNRS, Grenoble INP and the AGEFPI. It conducts its scientific activities in conjunction with the academic community of Grenoble Alpes University. LGP2 comprises three teams: *Biorefinery: chemistry and eco-processes* – *Multiscale biobased materials* – *Surface functionalization through printing processes*. Their research strives to meet society's expectations when it comes to sustainable development (green chemistry, clean processes, recycling, biobased materials, renewable energy) and traceability & safety (functional materials, smart paper and packaging). pagora.grenoble-inp.fr/research/



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chemistry, as well as the chemical, physico-chemical and biotechnological processes that allow them to be separated, purified or modified for the purpose of valorisation (biorefinery).

A special focus is also placed on the cellulose industry, because it currently displays the greatest potential when it comes to mass producing bioproducts – including fibres, fibrils and cellulose micro and nanocrystals – not to mention sugars, carbohydrates in general and lignin, which are immediately available for valorisation. The course also covers the heat processing of biomass (roasting, pyrolysis, gasification) and the synthesis of new polymers and composites for the design of biomaterials with specific properties: new functions, biodegradability, food contact, etc.

This multidisciplinary course features modules on chemistry, biology, enzyme catalysis, fermentation, process engineering, chemical and biotechnical engineering, polymerisation and material strength. It also broaches production costs, the sector's economic aspects and its environmental impact. The training is in line with the topics of the Tec21 Laboratory of Excellence, the Carnot Polynat Institute, CDP Glyco@Alps, the Grenoble Alpes University IDEX, and the Axelera Chemistry-Environment innovation cluster.

The skills that students acquire in the fields of chemistry, processes, biotechnology and polymerisation, but also in their application to plant biomass valorisation, are in high demand in various industrial sectors: cellulose, textiles, cosmetics, detergents, paints, plastics, packaging, energy, food, pharmaceuticals, etc.

Applications are open until 15 June 2018.

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